

IN THE TITLE:

Please amend the title to read:

SYSTEM FOR MONITORING PCR PROCESS

IN THE CLAIMS:

Please amend claims 13 and 168 to read as follows:

13. (Four Times Amended) A system for performing PCR and monitoring the reaction during temperature cycling comprising;

G1 a sample container for holding a PCR sample, the sample container comprising an optically clear material, the sample container formed for holding less than 1 milliliter of a sample and having a first side, a second side, and an end;

means for positioning the PCR sample container in a monitoring position;

means for heating the PCR sample at a rate of at least 1.0°C/second;

means for cooling the PCR sample at a rate of at least 1.0°C/second;

control means for repeatedly operating the means for heating and the means for cooling to subject the PCR sample to thermal cycling;

means for optically exciting the sample to cause the sample to fluoresce; and

means for detecting the fluorescence of the excited sample during amplification when the sample is in the monitoring position.

168. (Amended) A system for carrying out and monitoring the progress of first and second biological reactions comprising:

G2 first holding means for holding a first biological sample;

second holding means for holding a second biological sample;

transporting means for moving the first and second holding means between a non-monitoring position and a monitoring position;

thermal cycling means for repeatedly heating and cooling the first holding means and the second holding means in both the non-monitoring position and in the monitoring position to carry out thermal cycling on both the first biological sample and the second biological sample, wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 1.0°C/second;

monitoring means for ascertaining the progress of the first biological reaction in the first means for holding and the second biological reaction in the second means for holding when the first and second biological samples are in the monitoring position, the means for monitoring comprising means for detecting radiation emitted from the first and second biological samples; and

controlling means for controlling the operation of the transporting means, thermal cycling means, and the monitoring means such that the progress of the first and second biological reactions is detected as thermal cycling occurs.

Please add new claims 173-195 as follows:

173. (New) A system for performing PCR and monitoring the reaction during temperature cycling comprising;

a sample container for holding a PCR sample, the sample container comprising an optically clear material, the sample container formed for holding less than 1 milliliter of a sample and having a first side, a second side, and an end;

means for positioning the PCR sample container in a monitoring position;

means for heating the PCR sample at a rate of at least 10°C/second;

means for cooling the PCR sample at a rate of at least 10°C/second;

control means for repeatedly operating the means for heating and the means for cooling to subject the PCR sample to thermal cycling;

means for optically exciting the to cause the sample to fluoresce; and

means for detecting the fluorescence of the excited sample during amplification when the sample is in the monitoring position.

174. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 further comprising:

means for determining at least one reaction parameter in accordance with the detected fluorescence.

175. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 174 further comprising means for adjusting the control means in accordance with the reaction parameter.

176. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 175 in which the control means adjusts the

operation of the means for heating and the means for cooling to alter the times the means for heating and the means for cooling operate in accordance with the reaction parameter.

177. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 175 in which the control means adjusts the operation of the means for heating and the means for cooling to alter the rate at which the biological sample is heated and cooled in accordance with the reaction parameter.

178. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the sample container is fabricated at least partially from glass, the sample container having a volume not greater than about 10,000 μ l.

179. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for positioning the PCR sample container in a monitoring position comprises a rotatable carousel.

180. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 further comprising means for positioning the means for optically exciting the sample and the means for detecting the fluorescence of excited sample to optimize the fluorescence which is detected.

181. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for heating the PCR sample comprises a forced air heater.

182. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for cooling comprises an air movement mechanism which transports ambient air to the sample container.

183. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the control means comprises a microprocessor.

184. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for optically exciting the sample comprises a photo emitter structure positioned so that the radiation emitted therefrom impinges the first side of the sample container.

63 185. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 184 wherein means for detecting the

fluorescence of the excited sample comprises a photo detector structure positioned so that the radiation emitted from the second side of the sample container is detected.

186. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for optically exciting the sample comprises a photo emitter structure positioned so that the radiation emitted therefrom impinges the end of the sample container.

187. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 186 wherein the means for detecting the fluorescence of the excited sample comprises a photo detector structure positioned so that the radiation emitted from the end of the sample container is detected.

188. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 174 wherein the means for determining at least one reaction parameter in accordance with the detected fluorescence comprises means for determining at least one reaction parameter selected from the group consisting of: product melting temperature, product melting time, product reannealing temperature, product reannealing time, probe melting time, primer annealing/extension temperature, and primer annealing/extension time.

189. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the control means comprises means cooling the sample when the means for detecting the fluorescence of the excited sample detects that the product is completely melted.

190. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the control means comprises means for heating the sample when the means for detecting the fluorescence of the excited sample detects no more product generation.

191. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for optically exciting is positioned to interact with the first side of the sample container and the means for detecting the fluorescence is positioned to interact with the second side of the sample container.

192. (New) A system for performing PCR and monitoring the reaction during temperature cycling as defined in claim 173 wherein the means for optically exciting is positioned to interact with the end of the sample container and the means for detecting the fluorescence is positioned to interact with the end of the sample container.

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193. (New) The system of claim 173 wherein the rate of heating the PCR sample and the rate of cooling the PCR sample is at least 20°C/second.

194. (New) A system for carrying out and monitoring the progress of first and second biological reactions comprising:

first holding means for holding a first biological sample;

second holding means for holding a second biological sample;

transporting means for moving the first and second holding means between a non-monitoring position and a monitoring position;

thermal cycling means for repeatedly heating and cooling the first holding means and the second holding means in both the non-monitoring position and in the monitoring position to carry out thermal cycling on both the first biological sample and the second biological sample, wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 10°C/second;

monitoring means for ascertaining the progress of the first biological reaction in the first means for holding and the second biological reaction in the second means for holding when the first and second biological samples are in the monitoring position, the means for monitoring comprising means for detecting radiation emitted from the first and second biological samples; and

controlling means for controlling the operation of the transporting means, thermal cycling means, and the monitoring means such that the progress of the first and second biological reactions is detected as thermal cycling occurs.

195. (New) The system of claim 194 wherein the thermal cycling means heats and cools the first holding means and the second holding means at a rate of at least 20°C/second.

196. (New) The system of claim 13 further comprising a plurality of additional sample containers, wherein the means for positioning is configured to position each of the plurality of sample containers individually in the monitoring position.

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Please cancel, without prejudice, claim 159.